

**Physical Science Comes Alive:
Energy Systems Grades K – 1 (Invent-a-Wheel)**

Alignments to State Science Standards

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California State Science Content Standards
Physical Science Comes Alive: Energy Systems Grades K – 1 (Invent-a-Wheel)

Lesson #	California Science Content Standards - Kindergarten	California Science Content Standards – Grade One
1. How Can You Get It To Move?	K: IE 4a, b, c, e	1: IE 4a, b, d, e
2. Playground	K: IE 4a, b, c, e	1: IE 4a, b, d, e
3. Ramps and Sleds	K: IE 4a, b, c, e	1: IE 4a, b, c, d, e
4. Surfaces and Friction	K: PS 1a K: IE 4a, b, c, d, e	1: IE 4a, b, d, e
5. Sled Re-design	K: PS 1a K: IE 4a, b, c, d, e	1: IE 4a, b, d, e
6. Let’s Roll	K: PS 1a K: IE 4a, b, c, d, e	1: IE 4a, b, d, e
7. Make a Car	K: IE 4a, b, c, d, e	1: IE 4a, b, d, e
8. A Test Drive	K: IE 4a, b, c, d, e	1: IE 4a, b, d, e
9. Car Facts		
10. Write a How-to-Book		
11. Improve Your Ride	K: IE 4a, b, c, d, e	1: IE 4a, b, d, e
12. The Auto Show		
Key	California Science Standards K-5: Grade PS (Physical Science) IE (Investigation and Experimentation)	California Science Standards K-5: Grade PS (Physical Science) IE (Investigation and Experimentation)

Full Description of Standards

California Science Content Standards – Kindergarten
Physical Science
<p>K: PS 1. Properties of materials can be observed, measured, and predicted. As a basis for understanding this concept:</p> <p>K: PS 1a. Students know objects can be described in terms of the materials they are made of (e.g., clay, cloth, paper) and their physical properties (e.g., color, size, shape, weight, texture, flexibility, attraction to magnets, floating, sinking).</p>
Investigation and Experimentation
<p>K: IE 4. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:</p> <p>K: IE a. Observe common objects by using the five senses.</p> <p>K: IE b. Describe the properties of common objects.</p> <p>K: IE c. Describe the relative position of objects by using one reference (e.g., above or below).</p> <p>K: IE d. Compare and sort common objects by one physical attribute (e.g., color, shape, texture, size, weight).</p> <p>K: IE e. Communicate observations orally and through drawings.</p>
California Science Content Standards – Grade One Investigation and Experimentation
<p>1: IE 4. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:</p> <p>1: IE a. Draw pictures that portray some features of the thing being described.</p> <p>1: IE b. Record observations and data with pictures, numbers, or written statements.</p> <p>1: IE c. Record observations on a bar graph.</p> <p>1: IE d. Describe the relative position of objects by using two references (e.g., above and next to, below and left of).</p> <p>1: IE e. Make new observations when discrepancies exist between two descriptions of the same object or phenomenon.</p>
California Science Standards K-5: Grade PS (Physical Science) IE (Investigation and Experimentation)

District of Columbia Science Content Standards
Physical Science Comes Alive: Energy Systems Grades K – 1 (Invent-a-Wheel)

Lesson #	District of Columbia Science Content Standards - Kindergarten	District of Columbia Science Content Standards – Grade One
1. How Can You Get It To Move?	K: PS 4.3, 4 K: SI 1.1, 2, 3	1: PS 3.1, 2 1: SI 1.1, 2, 8
2. Playground	K: PS 3.1, 2, 4.3, 4 K: SI 1.1, 2, 3	1: PS 3.1, 2, 4 1: SI 1.1, 2, 8
3. Ramps and Sleds	K: PS 3.1, 2, 4.3, 4 K: SI 1.1, 2, 3	1: PS 3.1, 2, 4 1: SI 1.1, 2, 4, 5, 8
4. Surfaces and Friction	K: PS 3.1, 2, 4.3, 4 K: SI 1.1, 2, 3	1: PS 3.1, 2, 4 1: SI 1.1, 2, 4, 5, 7, 8
5. Sled Re-design	K: PS 3.1, 2, 4.3, 4 K: SI 1.1, 2, 3	1: PS 3.1, 2, 4 1: SI 1.1, 2, 4, 5, 7, 8
6. Let’s Roll	K: PS 3.1, 2, 4.3, 4 K: SI 1.1, 2, 3	1: PS 3.1, 2, 4 1: SI 1.1, 2, 4, 5, 7, 8
7. Make a Car	K: PS 3.1, 2, 4.3, 4 K: SI 1.1, 2, 3	1: PS 3.1, 2, 4 1: SI 1.1, 2, 4, 5, 7, 8
8. A Test Drive	K: PS 4.3, 4 K: SI 1.1, 2, 3	1: PS 3.1, 2, 4 1: SI 1.1, 2, 4, 5, 7, 8
9. Car Facts		1: SI 1.8
10. Write a How-to-Book		1: SI 1.8
11. Improve Your Ride	K: PS 3.1, 2, 4.3, 4 K: SI 1.1, 2, 3	1: PS 3.1, 2, 4 1: SI 1.1, 2, 4, 5, 7, 8
12. The Auto Show		
Key	District of Columbia Science Standards K-5: Grade PS (Physical Science) SI (Scientific Thinking and inquiry)	District of Columbia Science Standards K-5: Grade PS (Physical Science) SI (Scientific Thinking and inquiry)

Full Description of Standards

District of Columbia Science Content Standards – Kindergarten
Physical Science
<p>K: PS 3. Broad Concept: Objects can be described by their observable properties. As a basis for understanding this concept, students:</p> <p>K: PS 3.1. Recognize that objects are made of materials with particular properties -- such as clay, cloth, paper, metal etc.</p> <p>K: PS 3.2. Investigate and compare physical properties of objects (e.g., color, size, shape, weight, texture, flexibility, attraction to magnets, ability to float and sink).</p> <p>K: PS 4. Broad Concept: The motion of objects can be observed and measured. As a basis for understanding this concept, students:</p> <p>K: PS 4.3. Compare the position of an object in relationship to another object.</p> <p>K: PS 4.4. Explain that things move in many different ways, such as straight, zigzag, round and round, back and forth, and fast and slow.</p>
Scientific Thinking and inquiry
<p>K: SI 1. Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions about objects or events they can observe, and then perform simple investigations. Students:</p> <p>K: SI 1.1. Describe objects accurately by drawing pictures.</p> <p>K: SI 1.3. Gather information about objects through the use of one or more of the senses, such as sight, smell, touch, and (under supervision) taste.</p>
District of Columbia Science Standards K-5: Grade PS (Physical Science) SI (Scientific Thinking and inquiry)

District of Columbia Science Content Standards – Grade One

Physical Science

1: PS 3. Broad Concept: The motion of objects can be observed, measured, and changed. As a basis for understanding this concept, students:

1: PS 3. 1. Observe and describe that the way to make something move (faster or slower or in a different direction) is by giving it a push or a pull, which is called a *force*.

1: PS 3. 2. Explain that the greater the applied force, the greater the change in the motion of the object.

1: PS 3. 4. Recognize and demonstrate how things near Earth fall to the ground unless something holds them up (they are subject to the force of gravity).

Scientific Thinking and inquiry

1: SI 1. Broad Concept: Scientific progress is made by asking relevant questions and conducting careful investigations. As a basis for understanding this concept, and to address the content in this grade, students should develop their own questions and perform investigations. Students:

1: SI 1.1. Observe, describe, draw, and sort objects as a way of isolating and categorizing some of their properties.

1: SI 1.2. Investigate and make observations to seek answers to questions.

1: SI 1.4. Use tools, such as rulers and magnifiers, to investigate the world and make observations.

1: SI 1.5. Measure the length of objects having straight edges in centimeters or non-standard units to the nearest unit.

1: SI 1.7. Describe and compare objects in terms of number, shape, texture, size, mass, color, and motion.

1: SI 1.8. Write brief informational descriptions of a real object, person, place, or event using information from observations.

District of Columbia Science Standards
K-5: Grade
PS (Physical Science)
SI (Scientific Thinking and inquiry)

Minnesota Science Content Standards
Physical Science Comes Alive: Energy Systems Grades K – 1 (Invent-a-Wheel)

Lesson #	Minnesota Science Content Standards - Kindergarten	Minnesota Science Content Standards – Grade One
1. How Can You Get It To Move?	K: NSE 1.2.1	1: NSE 1.1.1-2
2. Playground	K: NSE 1.2.1	1: NSE 1.1.1-2
3. Ramps and Sleds	K: NSE 1.2.1	1: NSE 1.1.1-2
4. Surfaces and Friction	K: NSE 1.2.1	1: NSE 1.1.1-2
5. Sled Re-design	K: NSE 1.2.1	1: NSE 1.1.1-2 1: NSE 3.1.1 1: NSE 3.2.1
6. Let's Roll	K: NSE 1.2.1	1: NSE 1.1.1-2 1: NSE 3.1.1 1: NSE 3.2.1
7. Make a Car	K: NSE 1.2.1	1: NSE 1.1.1-2
8. A Test Drive	K: NSE 1.2.1	1: NSE 1.1.1-2 1: NSE 3.1.1 1: NSE 3.2.1
9. Car Facts	K: NSE 1.2.1	
10. Write a How-to-Book	K: NSE 1.2.1	
11. Improve Your Ride	K: NSE 1.2.1	1: NSE 1.1.1-2 1: NSE 3.1.1 1: NSE 3.2.1
12. The Auto Show	K: NSE 1.2.1	
Key	Minnesota Science Standards K-5: Grade NSE (The Nature of Science and Engineering) PS (Physical Science)	Minnesota Science Standards K-5: Grade NSE (The Nature of Science and Engineering) PS (Physical Science)

Full Description of Standards

Minnesota Science Content Standards – Kindergarten
Physical Science
K: NSE 1. The Practice of Science K: NSE 1. 2. Scientific inquiry is a set of interrelated processes used to pose questions about the natural world and investigate phenomena. K: NSE 1.1.1 Use observations to develop an accurate description of a natural phenomenon and compare one’s observations and descriptions with those of others.
Minnesota Science Content Standards – Grade One
The Nature of Science and Engineering
1: NSE 1. The Practice of Science 1: NSE 1.1 Scientists work as individuals and in groups to investigate the natural world, emphasizing evidence and communicating with others. 1: NSE 1.1.1 When asked "How do you know?," students support their answer with observations. 1: NSE 1.1.2 Recognize that describing things as accurately as possible is important in science because it enables people to compare their observations with those of others. 1: NSE 3. Interactions Among Science, Technology Engineering, Mathematics, and Society 1: NSE 3.1. Designed and natural systems exist in the world. These systems are made up of components that act within a system and interact with other systems. 1: NSE 3.1.1 Observe that many living and nonliving things are made of parts and that if a part is missing or broken, they may not function properly. 1: NSE 3.2. Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry. 1: NSE 3.2.1 Recognize that tools are used by people, including scientists and engineers, to gather information and solve problems.
Minnesota Science Standards K-5: Grade NSE (The Nature of Science and Engineering) PS (Physical Science)

**NY New York State Core Curriculum (updated) Elementary
Physical Science Comes Alive: Energy Systems Grades K – 1 (Invent-a-Wheel)**

Lesson #	NY New York State Core Curriculum (updated) Elementary
1. How Can You Get It To Move?	4: P5.1a, b
2. Playground	4: P5.1a, b, c
3. Ramps and Sleds	4: P5.1a, b, c
4. Surfaces and Friction	4: P5.1a, b, c, d
5. Sled Re-design	4: P5.1a, b, c, d 1: T1.1a, b, c, 2a, b, c, 3a, b, c, 4a, b, 5a, b, c
6. Let's Roll	4: P5.1a, b, c, d 1: T1.1a, b, c, 2a, b, c, 3a, b, c, 4a, b, 5a, b, c
7. Make a Car	4: P5.1a, b, c, d
8. A Test Drive	4: P5.1a, b, c, d 1: T1.1a, b, c, 2a, b, c, 3a, b, c, 4a, b, 5a, b, c
9. Car Facts	
10. Write a How-to-Book	
11. Improve Your Ride	4: P5.1a, b, c, d 1: T1.1a, b, c, 2a, b, c, 3a, b, c, 4a, b, 5a, b, c
12. The Auto Show	
Key	New York State Core Curriculum (Science) 1: Standard T (Engineering) S (Scientific Inquiry) P (Physical Science)

Full Description of Standards

NY New York State Core Curriculum (updated) Elementary Standards Description
Physical Science
<p>4: P5.1a The position of an object can be described by locating it relative to another object or the background (e.g., on top of, next to, over, under, etc.).</p> <p>4: P5.1b The position or direction of motion of an object can be changed by pushing or pulling.</p> <p>4: P5.1c The force of gravity pulls objects toward the center of Earth.</p> <p>4: P5.1d The amount of change in the motion of an object is affected by friction.</p>
Science and Technology
<p>1: T1.1 Describe objects, imaginary or real, that might be modeled or made differently and suggest ways in which the objects can be changed, fixed, or improved.</p> <p>1: T1.1a Identify a simple/common object which might be improved and state the purpose of the improvement</p> <p>1: T1.1b Identify features of an object that help or hinder the performance of the object</p> <p>1: T1.1c Suggest ways the object can be made differently, fixed, or improved within given constraints</p>
<p>1: T1.2 Investigate prior solutions and ideas from books, magazines, family, friends, neighbors, and community members.</p> <p>1: T1.2a Identify appropriate questions to ask about the design of an object</p> <p>1: T1.2b Identify the appropriate resources to use to find out about the design of an object</p> <p>1: T1.2c Describe prior designs of the object</p>
<p>1: T1.3 Generate ideas for possible solutions, individually and through group activity; apply age-appropriate mathematics and science skills; evaluate the ideas and determine the best solution; and explain reasons for the choices.</p> <p>1: T1.3a List possible solutions, applying age-appropriate math and science skills</p> <p>1: T1.3b Develop and apply criteria to evaluate possible solutions</p> <p>1: T1.3c Select a solution consistent with given constraints and explain why it was chosen</p>
<p>1:T1.4 Plan and build, under supervision, a model of the solution, using familiar materials, processes, and hand tools.</p> <p>1: T1.4a Create a grade-appropriate graphic or plan listing all materials needed, showing sizes of parts, indicating how things will fit together, and detailing steps for assembly</p> <p>1:T1.4b Build a model of the object, modifying the plan as necessary</p>
<p>1:T1.5 Discuss how best to test the solution; perform the test under teacher supervision; record and portray results through numerical and graphic means; discuss orally why things worked or didn't work; and summarize results in writing, suggesting ways to make the solution better.</p> <p>1:T1.5a Determine a way to test the finished solution or model</p> <p>1:T1.5b Perform the test and record the results, numerically and/or graphically</p> <p>1:T1.5c Analyze results and suggest how to improve the solution or model, using oral, graphic, or written formats</p>
<p>New York State Core Curriculum (Science)</p> <p>1: Standard</p> <p>T (Engineering)</p> <p>S (Scientific Inquiry)</p> <p>P (Physical Science)</p>

NY New York State Core Curriculum (updated) Elementary Standards Description

STANDARD 6 - Interconnectedness:

Common Themes Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning.

Area: Systems Thinking

Key Idea: Key Idea 1: Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions.

Indicator: observe and describe interactions among components of simple systems

Indicator: identify common things that can be considered to be systems (e.g., a plant, a transportation system, human beings)

Area: Models

Key Idea: Key Idea 2: Models are simplified representations of objects, structures, or systems, used in analysis, explanation, or design.

Indicator: analyze, construct, and operate models in order to discover attributes of the real thing

Indicator: discover that a model of something is different from the real thing but can be used to study the real thing

Indicator: use different types of models, such as graphs, sketches, diagrams, and maps, to represent various aspects of the real world

NY New York State Core Curriculum (updated) Elementary Standards Description

STANDARD 7- Interdisciplinary Problem Solving Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning.

Area: Connections

Key Idea: Key Idea 1: The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/society, consumer decision making, design, and inquiry into phenomena.

Indicator: analyze science/technology/society problems and issues that affect their home, school, or community, and carry out a remedial course of action

Indicator: make informed consumer decisions by applying knowledge about the attributes of particular products and making cost/benefit trade-offs to arrive at an optimal choice

Indicator: design solutions to problems involving a familiar and real context, investigate related science concepts to determine the solution, and use mathematics to model, quantify, measure, and compute

Indicator: observe phenomena and evaluate them scientifically and mathematically by conducting a fair test of the effect of variables and using mathematical knowledge and technological tools to collect, analyze, and present data and conclusions

Area: Strategies

Key Idea: Key Idea 2: Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits; gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among the common themes of mathematics, science, and technology; and presenting results.

Indicator: work effectively

Indicator: gather and process information

Indicator: generate and analyze ideas

Indicator: observe common themes

Indicator: realize ideas

Indicator: present results

PROCESS SKILLS BASED ON STANDARD 4

Area: General Skills

Process Skill: i. follow safety procedures in the classroom, laboratory, and field

Process Skill: ii. Safely and accurately use the following tools: hand lens, ruler (metric), balance, gram weights, spring scale, thermometer (C°, F°), measuring cups, graduated cylinder, timepiece(s)

Process Skill: iii. develop an appreciation of and respect for all learning environments (classroom, laboratory, field, etc.)

Process Skill: iv. Manipulate materials through teacher direction and free discovery

Process Skill: v. use information systems appropriately

Process Skill: vi. select appropriate standard and nonstandard measurement tools for measurement activities

Process Skill: vii. Estimate, find, and communicate measurements, using standard and nonstandard units

Process Skill: viii. Use and record appropriate units for measured or calculated values

Process Skill: ix. Order and sequence objects and/or events

Process Skill: x. classify objects according to an established scheme

Process Skill: xi. Generate a scheme for classification

Process Skill: xii. Utilize senses optimally for making observations

Process Skill: xiii. Observe, analyze, and report observations of objects and events

Process Skill: xiv. Observe, identify, and communicate patterns

Process Skill: xv. Observe, identify, and communicate cause-and-effect relationships

Process Skill: xvi. Generate appropriate questions (teacher and student based) in response to observations, events, and other experiences

Process Skill: xvii. Observe, collect, organize, and appropriately record data, then accurately interpret results

Process Skill: xviii. Collect and organize data, choosing the appropriate representation: journal entries, graphic representations, drawings/pictorial representations

Process Skill: xix. Make predictions based on prior experiences and/or information

Process Skill: xx. Compare and contrast organisms/objects/events in the living and physical environments

Process Skill: xxi. Identify and control variables/factors

Process Skill: xxii. Plan, design, and implement a short-term and long-term investigation based on a student- or teacher-posed problem

Process Skill: xxiii. Communicate procedures and conclusions through oral and written presentations